

REMARKS

Applicants graciously thank the Examiner for his time in reviewing the application with Applicants' attorney in telephone interview on March 28, 2005, upon which the present amendment and remarks are based.

Claims 1-12 are pending in the application and are rejected. Claims 1, 7, 8 and 10-12 are herein amended.

Examiner Interview

Applicants again thank the Examiner for his time and consideration to the Interview with Applicants' attorney on March 16, 2005. The Interview with Applicants' attorney clarified that the Examiner would not give further weight to Applicants' arguments as previously presented, because (1) claims 1-7 were not limited to the recited order of steps, and (2) claims 8-12 were not sufficiently clarified to the intended order of steps. The Examiner strongly asserted that the recitation of the near-simultaneous performance of the plasma step and etching step of the prior art necessitated more concrete clarification of the claims.

Applicants attorney agreed with the Examiner to further clarify the order of steps in the present amendment, in return for the Examiner's consideration of this amendment-after-final.

In order to overcome the prior art, Applicants herein amend claims 1, 7, 8 and 10-12 to more strictly recite the order of steps to overcome the substantive rejections of record. Applicants further correct the language ("to give damages to the insulating film") in claim 12 that had been previously objected to in claims 1 and 10.

Claim Rejections - 35 U.S.C. §102

Claims 8 and 11 are rejected under 35 U.S.C. §102(e) as being anticipated by Nallan et al. (U.S. Publication No. 2004-0002223).

Applicants herein amend claims 1, 7, 8 and 10-12. Thereafter, Applicants respectfully submit that the rejection has been overcome.

As presently amended, the claims clearly emphasize the sequential order of the claimed steps. That is, the steps are performed in the order recited in the claims. That is, the region of the film is first exposed to a plasma (N, Ar, or NH₄) to make the region more easily etched, and then it is etched *after* the plasma treatment. That is, the steps in a cited reference can not be simultaneously performed, nor can they be performed in the reverse order, or else the claim is improperly rejected.

On the other hand, according to the summary of invention of Nallan et al., “In one embodiment of the invention, an etch gas comprising chlorine, carbon monoxide, and nitrogen is used for etching a hafnium dioxide film. In another embodiment, the passivation gas is used *after* etching is complete to passivate the exposed silicon.” That is, the passivating gas of Nallan et al. is either used simultaneously with the etching gas or it is used after the etching gas. Neither of these possible alternatives is read upon by claim 8 of the present invention, as herein clarified. Therefore, because at least this limitation is not met by the cited reference, Applicants submit that the rejection has been overcome.

Claim Rejections - 35 U.S.C. §103

Claim 9 remains rejected under 35 U.S.C. §103(a) as being unpatentable over Nallan et al. (U.S. Pub. No. 2004-0002223), as applied in Paragraph 2 above, and in view of Tsunashima et al.

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(U.S. Publication No. 2001-0023120). The Examiner admits that Nallan et al. does not specifically disclose using sulfuric acid or mixture liquid of sulfuric acid and hydrogen peroxide to etch the insulating layer. However, the Examiner concludes that it would have been obvious to provide Nallan et al. reference with etching of the insulating layer using sulfuric acid as taught by Tsunashima et al. in order to form a patterned gate stack by using sulfuric acid to remove (etch) the amorphous metal oxide layer insulating (gate dielectric film).

Claims 4-6 and 12 remain rejected under 35 U.S.C. §103(a) as being unpatentable over Aoyama (U.S. Patent No. 6,150,221) in view of Callegari et al. (U.S. Patent No. 6,573,197), and further in view of Tsunashima et al. (U.S. Publication No. 2001-0023120).

Claims 1-3, 7 and 10 remain rejected under 35 U.S.C. §103(a) as being unpatentable over Aoyama (U.S. Patent No. 6,150,221) in view of Callegari et al. (U.S. Patent No. 6,573,197).

Applicants herein amend claims 1, 7, 8 and 10-12. Thereafter, Applicants respectfully submit that the rejection has been overcome.

As noted above, the claims as presently amended clearly emphasize the sequential order of the claimed steps. That is, the steps are performed in the order recited in the claims. That is, the region of the film is first exposed to a plasma (N, Ar, or NH₄) to make the region more easily etched, and then it is etched *after* the plasma treatment. That is, the steps in a cited reference can not be simultaneously performed, nor can they be performed in the reverse order. Because the cited reference only teaches the simultaneous performance of the steps, or the order of steps reversed from that claimed, Applicants submit that the rejection has been overcome.

Furthermore, Applicants note that Aoyama does not teach or suggest transforming the silicon oxide insulating film to an amorphous state, because when the gate insulating film is made of silicon oxide as in Aoyama instead of zirconia or hafnia, the impurity concentration has

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a maximum at deeper position than the case where the insulating film is made of HfO₂, and in the case of Aoyama, the insulating film (2) is not converted into amorphous state.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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